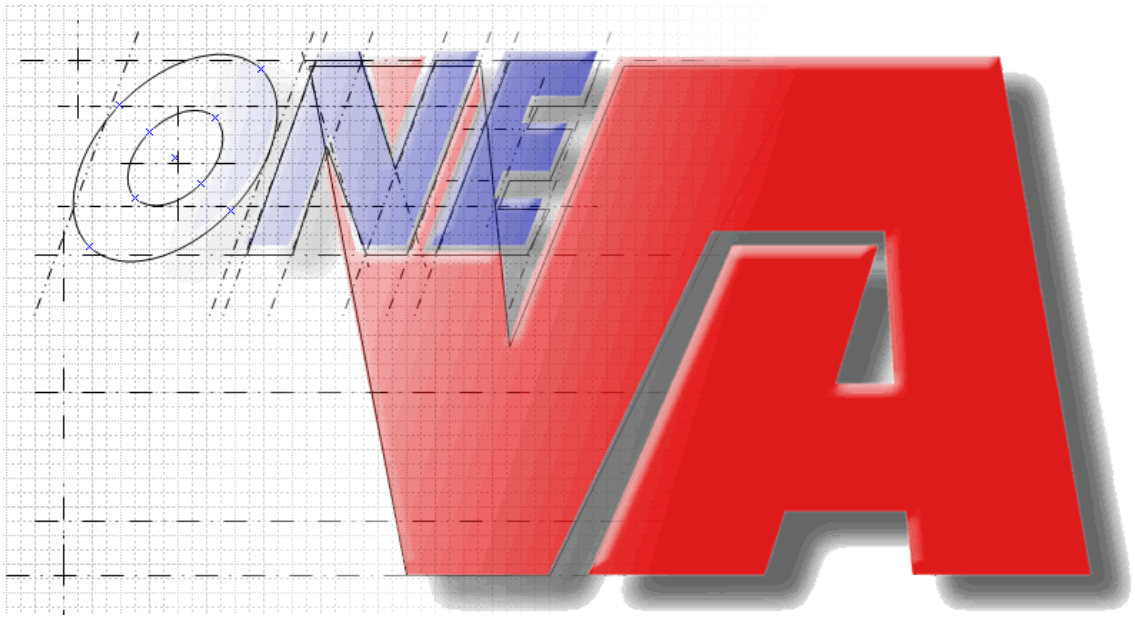
OneVA Enterprise Architecture Guidance

Version 1.0



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EXECUTIVE SUMMARY

The OneVA[1] Enterprise Architecture Framework (1EAF) (to be published under separate cover) outlines the vision and strategy for creating the OneVA Enterprise Architecture (EA) and aligning the supporting systems and technologies with the Department's business operations. This document, titled "OneVA Enterprise Architecture Guidance," promulgates the goals and related guidance that promotes a OneVA approach to the EA. This guidance will drive the proper use of technologies and data within the organization, creating a unified presence needed to make "OneVA" a reality for Veterans. In concert with the above approach, the Chief Architect issues the following principles:

Strategic Objectives:

- Business direction will drive the OneVA Enterprise Architecture
- OneVA Architecture shall facilitate, not impede, communication, information and data sharing across VA
- OneVA Architecture will be relatable and comparable across VA

Tactics to support delivery of the Strategic Objectives:

- Administration architectures will implement OneVA
- OneVA Architecture shall be modular, reusable, and decomposable
- VA Administrations will use common terms and definitions
- Architects will design and follow a standard process for developing EA components

This OneVA EA Guidance also provides specific instruction in support of the Chief Architect's technology goals to:

- **Promote reusable service components and segments:** To maximize reusability of components across the enterprise, adhere to a three-tiered technical model (e.g., Presentation, Business Logic, and Data) in tandem with a Service Oriented Architecture (SOA).
- **Establish a common view of data:** To promote data sharing across the enterprise, develop an Enterprise Data Dictionary, develop a data access layer that will be migrated to an Enterprise Data Services (EDS) layer, and incorporate common components to access Veteran identification and location information.
- **Establish a robust infrastructure**: To ensure a reliable foundation across the enterprise require project, network, and information technology (IT) components to deliver appropriate Continuity of Operations Planning (COOP) and Continuity of Government (COG) capability; robust enterprise storage solutions, and support for Quality of Service necessary to support the full range of business IT solutions.

[1] OneVA is a concept supported by the Secretary as a way of capturing the notion that the different agencies of the Department of Veterans Affairs - Veterans Health Administration (VHA), Veterans Benefits Administration (VBA), National Cemetery Administration (NCA), Headquarters, and Staff Offices - are actually one entity.

Achieving these goals are precursors to the eventual development of a Vision Architecture that will provide for high confidence in veteran centric self service.

To ensure all IT development is consistent with the vision of the Chief Architect, all future IT architectural development and program development shall follow the specific guidance outlined below. All development must be coordinated with the Chief Architect and peer reviewed by the Enterprise Architecture Council (EAC) at each phase of the Systems Development Life Cycle.

I. Chief Architect Guiding Principles[†]

All VA architects, program managers, project coordinators, and technicians will adhere to this guidance. Detailed project technical guidance can be found in the Technical Reference Model (TRM).

A. Business Direction Will Drive the OneVA EA

Strategic planning will drive business planning; business planning will drive technical planning. This relationship ensures that the OneVA EA is aligned with the strategic plans of the Department. We exist to serve our veterans. The OneVA EA promotes the use of technology to provide seamless service, regardless of the veterans' point of entry. To achieve the goal of seamlessness we will enable enterprise program delivery and leverage investments through the reuse of products and services to the greatest extent possible.

When fulfilling solutions to meeting new requirements, the Lines of Business must demonstrate how the proposed program will leverage existing or proposed IT investments. They will support security and privacy components throughout the lifecycle, and will comply with the milestone review process (MS-0 thru MS-4).

B. Administration Architectures Will be Built with the OneVA Purpose in Mind

All VA architectures descriptions will be built with the purpose and vision of OneVA architecture. This means they will be built with the purpose of a single veteran interface and from the veteran's view of the VA. Building architectures that can be utilized throughout the VA will increase the efficiency of the effort and the function of the resulting architecture. The purpose determines the width and depth of the scope, which characteristics to capture, and what time frames to consider. This principle applies equally to the description of an architecture as a whole or to any portion or view of an architecture. This principle can also apply to groups of architectures. If architecture descriptions built by various VA administrations are to be compared, it is important that they all be built from the start with the purpose of comparison in mind.

C. OneVA Architecture Will Facilitate, Not Impede, Communication Among All VA

Architecture descriptions must be structured to ensure that they are readily understandable and guide the process of discovering, analyzing, and resolving issues. Extraneous information must be excluded. Graphical representation of the architecture products using standard modeling techniques must be used.

[†] Elements of this guidance have been taken from the *DoDAF, 5.1, Volume 1*, February 9, 2004.

D. OneVA Architecture Will be Relatable and Comparable Across VA

This principle requires the use of a common set of architectural building blocks or reference documents as the basis for architecture descriptions. This principle dictates that products of a given type developed for different architectures must display similar information about their respective domains, in similar formats. The appropriate, common format and information content for each product type must be specified in architecture guidance, such as in the 1EAF.

In order to relate architectures, it is critical to capture external interfaces. Architecture descriptions must clearly describe external interfaces with all VA administrations and commercial components in a manner consistent with the method used to describe internal relationships.

E. OneVA Architecture Will be Modular, Reusable, and Decomposable

Architecture descriptions should consist of related pieces that can be recombined with a minimal amount of tailoring, so that they can be used for multiple purposes. *Architectures must be developed to incorporate change and integration with other VA architectures.* The set of products to be built, the characteristics to capture in those products, and high- level steps for using the 1EAF have been designed to ensure that the above principles are followed.

F. VA Administrations Will Use Common Terms and Definitions

Architecture descriptions will use common and/or standardized terms and definitions. The criticality of common language during architecture product creation, analysis, comparison, and integration cannot be over emphasized. The control of vocabulary, to include the use of a common language for product names, architecture data elements, and common system data values helps to minimize potential misrepresentations and misunderstanding of shared information, and assists with architecture consistency and validation. The OneVA Enterprise Architecture Framework defines a standard for architecture product names, standard architecture data elements, their attributes, and their relationships. The 1EAF defines the standard for these architecture data elements as entities and defines their relationships. It also requires that every architecture description contain an Integrated Dictionary that defines terms used in the architecture. Use of automated tools and a compliant data repository, facilitates commonality in architecture data names, attributes, and relationships.

G. Architects Will Design and Follow a Standard Process for Developing EA Components[‡]

The following paragraphs outline the processes for integrating and coordinating all architecture and project plans in order to create a consistent, coherent architecture descriptions. A high- level, eight-step process has been developed to provide some general guidance to the architect and to emphasize the guiding principles. This generic process must be tailored to specific administrations and purposes. These processes should also be interoperable with current architecture and ongoing operations. Additionally, they provide a source of conceptual guidance for architects who are developing their own processes.

The following steps are fundamental to describing an architecture in accordance with the Chief Architects vision.

[‡] 6 of these 8 steps are originally found in the *DODAF Version 1, Volume 1, "Definitions and Guidelines"*,February 9, 2004, page 5-4 and following.

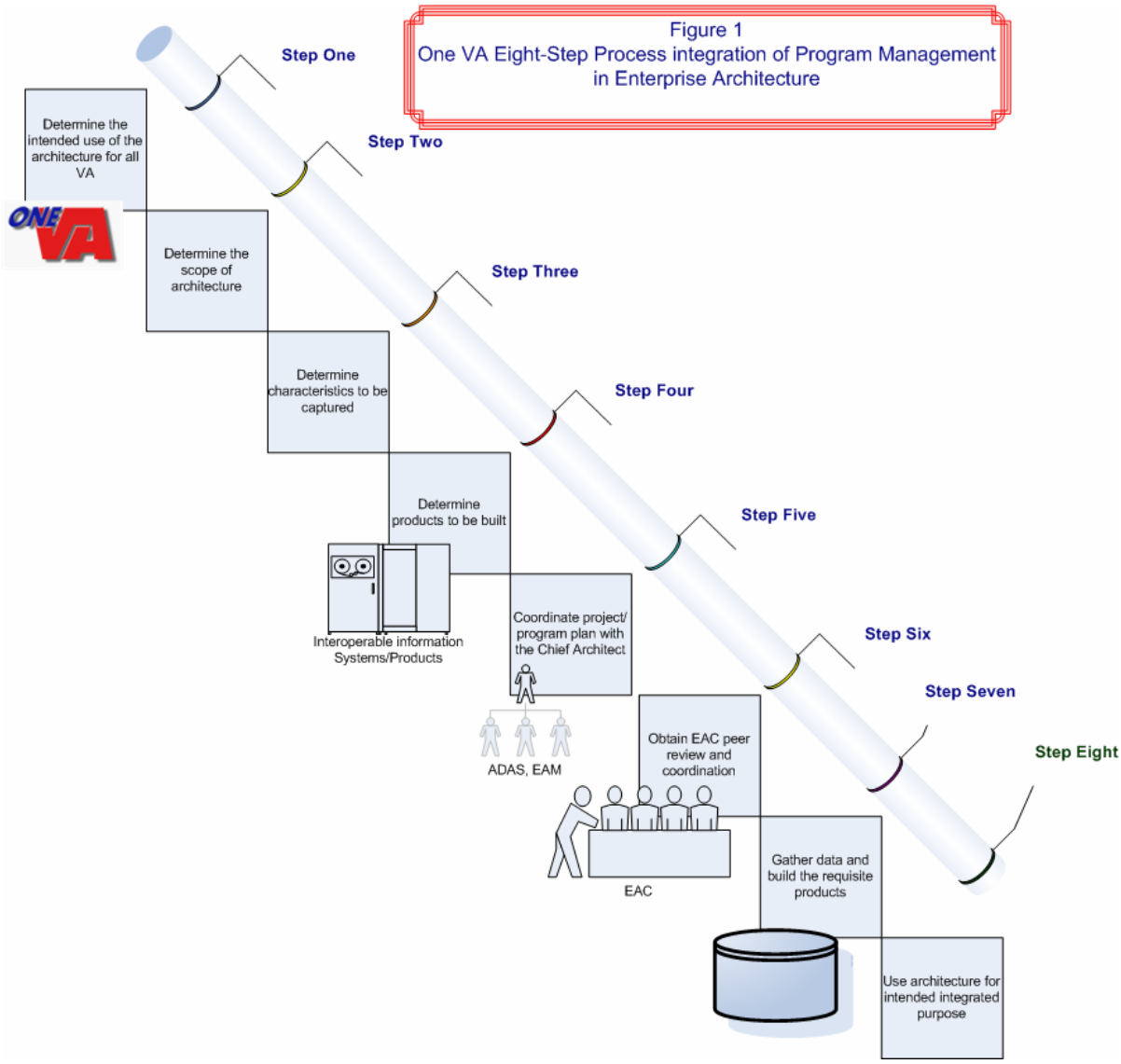

Figure 1 -- The Eight-Step Process of Integration of One-VA Enterprise Architecture into Program Management

1. Step One: Development and Integration. Determine the intended use of the architecture for all VA

Before beginning to describe an architecture, administration architects and program managers must develop products that uses the outputs of other planning processes, including the Chief Architects strategic plan. This will create a consistent, coherent VA architecture that can be used to guide both project execution and project control, as it is integrated into the architecture. Administration architects must also determine, as specifically as possible, the issue(s) the description is intended to explore, the questions it is expected to help answer, and the interests and perspectives of the audience and users. In addition, the types of analysis that are expected to be performed must be considered; for example, knowing that the architecture may be used as input to specific models or simulations can affect what should be included and how the products

must be structured. This focusing will make the architecture description effort more efficient and the resulting architecture more appropriately balanced and useful.

2. Step Two: Determine the architecture description's scope

Once the purpose or use has been decided, the prospective content of the architecture description or program can be determined. Architecture scope and descriptions must outline the characteristics of the product or service that the project was undertaken to create. It should also document the relationship between the produce or service being created and the business need or other stimulus that generated to the project. Project management factors that contribute to the above determinations include the resources available for describing the architecture, the resources and level of expertise available for analyzing the architecture, and availability of the necessary architecture data.

3. Step Three: Based on the intended use and the scope, determine what information the architecture description needs to captured

Care must be taken to determine the architecture information that needs to be included to satisfy the purpose. If pertinent information is omitted, the architecture description may not be useful; if unnecessary information is included, the architecture effort may prove infeasible given the time and resources available, or the description may be confusing and/or cluttered with details that are superfluous to the issues at hand. Care must be taken as well to predict the future uses of the architecture description so that, within resource limitations, it can be structured to accommodate future tailoring, extension, or reuse.

4. Step Four: Determine products to be built

Based on the understanding gained in Steps 1 through 3 and referring to TRM Products Matrix, the architect or program manager must determine which products to build and what architecture data must be gathered to build the products.

5. Step Five: Coordinate project/program plan with the Chief Architect

All architecture descriptions and projects that directly affect the OneVA EA will be coordinated via the ADAS, Enterprise Architecture Management (EAM). The Chief Architect will ensure that architecture descriptions are in compliance with the his vision and the best interest of all VA organizations. After review by the Chief Architect all architecture description will be forwarded for peer review by the EAC. Note: the Chief Architect has final approval authority of all architecture descriptions and projects.

6. Step Six: Obtain EAC peer review and coordination

All architecture descriptions and projects that directly affect the OneVA EA must be peer reviewed by the EAC to ensure interoperability compliance. The EAC will provide collaborative participation point and a peer-review process for the VA administrations and service areas. This directly influences sharing and active participation from all architects. The Enterprise Architecture Council's primary mission is to: develop, review and adopt technical standards; perform IRM proposed project architectural evaluations; and identify, develop and sponsor crosscutting or department-wide IT initiatives which lack specific administration sponsorship.

7. Step Seven: Gather the architecture data and build the requisite products.

The next step is to collect, correlate, and compose the necessary architecture data that will form the basis for the products. To facilitate integration with other architectures, architectures must be developed to be compliant with the OneVA Enterprise Architecture, and include relationships with other VA administration and other departments and/or components if applicable. If the architecture description needs some re-tailoring to serve its purpose, that tailoring must be done as efficiently as possible. It may be useful, resources permitting, to conduct some proof-of-principle analysis at various stages, i.e., make trial runs of step six using carefully selected subsets of the areas to be analyzed. Care must be taken to ensure that the products built are internally consistent and properly integrated. Use of automated tools and a compliant architecture data repository can facilitate the architecture development process, assist in the use of common terms/definitions, and facilitate compliance with the all administration architectures.

8. Step Eight: Use the architecture description for its intended purpose.

The architecture description facilitates and enables these purposes but does not provide conclusions or answers. For that, human and possibly automated analysis must be applied. The OneVA architecture does not attempt to dictate how this analysis should be performed; rather, the OneVA Architecture intends to promote architecture descriptions that are sufficiently complete, understandable, and integratable to serve as one basis for such analysis.

II. The Value of Integration

An integrated architecture is essential for many types of analyses. Integrated architectures are necessary because they relate systems capabilities to how administrations operate or how business is conducted, to assess interoperability, and to identify system duplications and gaps throughout the VA. In addition, the ability to integrate multiple architectures is essential for addressing enterprise issues across a broad domain such as the VA. It enables multiple groups to develop architectures with the focus that best meets their immediate needs. Those architectures can then be integrated to address issues that cross more than one area. No one architecture could hope to address the whole of VA and its diversity of missions in sufficient detail where all of the various types of analyses, enabled by the architecture construct, could be supported.

III. TRM Executive Summary – Chief Architect Key Information Technology Practices

The Technical Reference Model provides a framework description and design guidance for approved technologies within the VA Enterprise Architecture. It uses a common vocabulary to describe selected technical services that developers and implementers can use to support business functions of the VA enterprise. The following section summarizes the key aspects for the TRM that are of particular importance to the Chief Architect.

A. Promote Reusable Service Components

Promoting reusable components through the elimination of stove-piped modules will reduce development costs and improve overall quality by leveraging economies of scale. This supports the EA goal of developing a Service Oriented Architecture. To promote reusability the Chief Architect issues the following guidance:

1. Three-Tiered Model

Requiring adherence to a three tiered model that EAM will validate during their Milestone 2 review. Therefore, a component will fall into one of these categories of a distributed application:

- **Presentation** – displays data to and captures input from the user. Specifically to this tier EAM will also validate the:
  - User Interface (UI) is compliant with *Architectural and Transportation Barriers Compliance Board; Section 508 Standards (36 CFR Part 1194)*
  - UI is browser-based and platform/vendor independent by using industry accepted web-based standards
  - UI contains no processing logic outside of enhancing its interactive or cosmetic capabilities (e.g., Thin-clients)
- **Business Logic** – provides process management (i.e., development, enactment, monitoring, and resourcing) where business logic and rules are executed. Specifically to this tier EAM will also validate:
  - Component logic will be implemented in an object-oriented manner using either J2EE or .NET technologies
  - Components are documented in the Enterprise Registry and contain a description, interface set, object model, access methods, support contract, constraints, and potential costs
  - Components are tied to architectural patterns identified by EAM which will lead to standardized implementations and illustrate the proper place for the re-usable components
- **Data** – provides information management functionality ensures data is consistent throughout the distributed environment through the use of data locking, synchronization, and replication
  - See paragraph 2.B. below, *Establish Common View of Data*.

2. Service-Oriented Architecture (SOA)

Requiring adoption of a Service-Oriented Architecture (SOA), where services are self-contained, larger-grained business logic components that directly implement business

functions and do not depend on the context of the other service. Furthermore, these services shall:

- Support proxy patterns that dynamically selects and changes client binding at run-time (e.g., service discovery)
- Participate in the Enterprise UDDI Registry where all services and their interfaces will be described using WSDL
- Support dynamic process flows via BPEL4WS triggered by information in a business document (e.g., set SOAP Binding Style to "document", not "RPC")
- Exchange XML-encoded business documents over the HTTP transport using the SOAP protocol
- Expect asynchronies calling pattern and conform to an event-driven architecture, do not assume a request/response pattern
- Maintain state only in the business document, services cannot store data between transactions, which would violate the context free definition

B. Establish Common View of Data

Establishing a common view of data across the Department through standardization and consolidation will directly support the Veterans' ease of interactions with the Department by enabling a major component of OneVA. Overall, improved data management practices at the enterprise level will improve the accumulation, usage, reuse, maintenance, storage, and internal and external transfer of data. To establish this common view of data the Chief Architect issues the following guidance.

1. Enterprise Data Model and Dictionary

Each project must have a data dictionary at their milestone reviews that must be synchronized with the Enterprise Data Dictionary and must contain:

- Milestone 0 – key business terms (vocabulary), their descriptions, and relationships to other terms.
- Milestone 1 – logical, technology-independent information that is either stored or exchanged along with any new key terms – developed for Milestone 0. Depending on the appropriate organization of the information adopt:
    - Relational – Logical Entity-Relationship Model (IDEF1X notation) organized by subject area and containing the entities, elements, keys, and descriptions for each.
    - Object or Hierarchical – Class Model (UML notation) organized by package and containing classes, attributes, associations, and descriptions for each.
    - Exchanges – use the notation that corresponds to your primary storage method.
- Milestone 2 – physical data that is either stored or exchanged along with any new key terms and pointers back to their logical model – developed for Milestones 0 & 1, respectively. Depending on the chosen technology adopt:
    - Relational – Physical Entity-Relationship Model (IDEF1X notation) that augments the Logical ER model with databases specific attributes and is in a minimum of 3rd Normal Form.
    - Object & Hierarchical – Class Model (UML notation) that augments the Logical Class model with language specific attributes.

- All – whenever possible the encoding of element values need to be tied industry accepted standards (i.e., CPT 4, NDC, ICD-9-CM, etc.) and noted in the descriptions.

2. Data Access

Each project is required to incorporate a data access layer between their business-logic tier and data tier. No longer will a business-logic component be allowed to directly access information stored in a database (e.g., no SQL in business-logic components). The data access layer will contain a clearly defined set of interfaces for manipulating the data (CRUD) and incorporate centralized authentication, roles-based access control, and auditing. EAM will validate the data access layer during the Milestone 2 review.

3. Enterprise Data Services Layer

Developing an Enterprise Data Services (EDS) layer, under the Registration, Eligibility and Contact Management (RECM) project, that will replace individual project's or administration's data access layers developed above. The EDS will strive to support the project's interfaces for data manipulation and will further centralize the authentication and auditing. Additionally, the EDS will incorporate a disaster tolerant architecture through replication across geographic dispersed centers to ensure COOP.

4. Veteran Identification and Location Data

Consolidating Veteran identification and location information in the EDS and will provide a set of common services for manipulating that information. Once these services are deployed all future projects will be required to use them and EAM will develop a migration plan to retrofit these services into legacy applications and all other legacy repositories of veteran information will be decommissioned. Afterwards, other mission-critical data groups that have the potential to span administrations or departments will be identified for inclusion into the EDS.

C. Establish a Robust Infrastructure

The infrastructure must meet the needs at the VA by being robust, scaleable, flexible, and secure. Recognizing that the demands for new technologies are constantly increasing and changing, the infrastructure will allow for growth and expansion; adaptation to new technologies and applications; and accommodation of specialized equipment needed for medical research. To establish a robust infrastructure the Chief Architect requires the following:

1. Effective COOP and COG

Each project is required to implement an effective Command and Control, COOP and COG infrastructure that must contain:

- Technologies supporting a distributed, fault-tolerance data architecture necessary to reduce the risk associated with a data center failure or a denial-of-service attack.
- Technologies that ensure a common set of organizing principles so that prompt relocation and recovery is feasible.
- Technologies that support a strong transaction-processing model thereby eliminating the risk associated with non-Isolated events.

2. Robust Enterprise Storage Solutions

Each project is required to adhere to the following characteristics for enterprise storage solutions to:

- Be capable of accommodating a variety of interfaces;
- Be host independent;
- Have a robust disaster recovery capability;
- Provide 99.99 percent data availability; and
- Provide robust replication functionality.

3. Organizationally Specific Network and IT COOP and COG

All enterprise networks and major IT components will implement a Continuity of Operations Plan (COOP) that is tailored to fit the needs of the specific organization. The COOP may include items such as:

- Command and control of information technology assets during emergency situations to ensure continuation of mission-critical and mission-essential operations
- A coordinated response and recovery effort to effectively mitigate an emergency or disaster
- The ability to provide mission-critical and mission-essential responsibilities during and after an emergency situation
- Reconstitution, as rapidly as possible, information technology systems that are adversely affected due to an emergency or disaster
- Mitigation strategies that will ensure the survival of the Department's critical IT infrastructure
- Regular training and exercises designed to enable all personnel to perform assigned emergency management duties
- A standardized format for reporting the status of essential VA IT systems and functions

4. Develop an IPv6 Environment

All Internet Protocol (IP) networks are required to be updated (as necessary) to support the full range of authorized applications. This will include, but not be limited to the procurement of all new IP and IP support components to those that are Internet Protocol Version 6 (IPv6) compliant. All existing IP networks will be required to migrate to a total IPv6 environment over the next several years.